

# PATENT ABSTRACTS OF JAPAN

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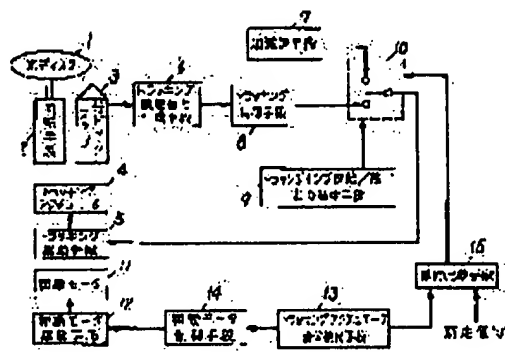
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## (54) TRACK JUMP DEVICE

### (57)Abstract:

**PURPOSE:** To stably perform track jump by suppressing deviation from a light axis and performing stably focus and tracking control during track jump and immediately after track jump, by stopping track jump and turning on tracking control at the position when displacement of a tracking actuator exceeds a prescribed value during track jump, in an optical recording and reproducing device.

**CONSTITUTION:** An output of a tracking actuator displacement detecting means 13 is compared with the prescribed value (a) by a first comparing means 15, when a displacement detected output is larger than the prescribed value, an instruction for stopping track jump is outputted from the first comparing means 15. Thereby, an output of a tracking control means 8 is selected in a first selecting means 10. Thus, by stopping track jump and turning on tracking control, deviation from the light axis caused by displacement of the tracking actuator is suppressed.



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CLAIMS

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[Claim(s)]

[Claim 1] By condensing a light beam to a rotation means to rotate the optical disk with which the information signal is recorded with the predetermined truck gestalt, and the information side of said optical disk, forming an optical spot in them, and detecting the reflected light The optical pickup which outputs the disk radial relative-position error of said information signal and said truck, and said optical spot, The tracking actuator made to move said optical spot to the disk radial, The tracking control means which controls the disk radial of said optical spot by considering the relative-position error of said truck which said optical pickup outputs, and said optical spot as an input, An acceleration-and-deceleration means to accelerate or slow down said tracking actuator in order to move said optical spot to a target truck location, the tracking actuator which detects the variation rate of said tracking actuator -- a variation rate -- with a detection means A comparison means to compare the output and predetermined value of said tracking actuator displacement detection means, Track jump equipment equipped with a selection means to choose one of the output of said acceleration-and-deceleration means, and the outputs of said tracking control means, and to impress the output to said tracking actuator according to the output of said comparison means.

[Claim 2] By condensing a light beam to a rotation means to rotate the optical disk with which the information signal is recorded with the predetermined truck gestalt, and the information side of said optical disk, forming an optical spot in them, and detecting the reflected light The optical pickup which outputs the disk radial relative-position error of said information signal and said truck, and said optical spot, The tracking actuator made to move said optical spot to the disk radial, A relative-speed-detector means to detect the relative velocity of said truck and said optical spot by considering the output of said optical pickup as an input, The tracking control means which controls the disk radial of said optical spot by considering the relative-position error of said truck which said optical pickup outputs, and said optical spot as an input, An acceleration-and-deceleration means to accelerate or slow down said tracking actuator in order to move said optical spot to a target truck location, A relative-velocity oppression means to drive said tracking actuator in the direction which oppresses the relative velocity of said truck and said optical spot, the tracking actuator which detects the variation rate of said tracking actuator -- a variation rate -- with a detection means The 1st comparison means which compares the output of said tracking actuator displacement detection means with the 1st predetermined value, The 2nd comparison means which compares the output of said relative-speed-detector means with the 2nd predetermined value, The output chosen with the output of said 1st comparison means is switched to the output of said relative-velocity oppression means from the output of said acceleration-and-deceleration means. Track jump equipment equipped with a selection means to switch the output chosen with the output of said 2nd comparison means from the output of said relative-velocity oppression means to the output of said tracking control means, and to impress the output to said tracking actuator.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the track jump equipment made to move an optical spot to a predetermined track in an optical disk.

[0002]

[Description of the Prior Art] In recent years, in the field with a broad optical disk, application progresses and frequent random access is especially needed in applications, such as karaoke, a data file, and computer external memory. Therefore, let stability of access actuation be an important technical problem in track jump equipment.

[0003] Below, conventional track jump equipment is explained. Drawing 5 is the block diagram of conventional track jump equipment. The optical disk with which the information signal is recorded with the track predetermined in 1 in drawing 5, A rotation means by which 2 rotates an optical disk 1, and 3, by condensing a light beam to the information side of an optical disk 1, forming an optical spot in it, and detecting the reflected light The optical pickup which outputs the disk radial relative-position error of the information signal and the track, and the optical spot which were recorded, The tracking actuator which 4 makes move an optical spot to the disk radial, The tracking driving means to which 5 drives the tracking actuator 4, A tracking error signal generation means by which 6 generates a tracking error signal from the output of an optical pickup 3, An acceleration-and-deceleration means by which 7 accelerates or slows down the tracking actuator 4, The tracking control means which 8 considers a tracking error signal as an input, and performs tracking control, A track jump initiation / termination command generating means by which 9 generates initiation of a track jump and the command of termination, and 10 with the output of track jump initiation / termination command generating means 9 The 1st selection means which chooses one of the output of the acceleration-and-deceleration means 7, and the outputs of the tracking control means 8, The coarse adjustment motor which 11 makes move the optical pickup 3 whole to the disk radial, a coarse adjustment motorised means by which 12 drives the coarse adjustment motor 11, and the tracking actuator, with which 13 detects the variation rate of the tracking actuator 4 -- a variation rate -- a detection means -- 14 is a coarse adjustment motor control means which controls the coarse adjustment motor 11 by considering the output of the tracking actuator displacement detection means 13 as an input.

[0004] About the track jump equipment constituted as mentioned above, the actuation is explained below.

[0005] In order to perform a track jump, a track jump initiation command is made to output from track jump initiation / termination command generating means 9, and the output of the 1st selection means 10 is switched to the output of the acceleration-and-deceleration means 7 from the output of the tracking control means 8. Then, the seal of approval of the output of the acceleration-and-deceleration means 7 is carried out to the tracking driving means 5, and the tracking actuator 4 is driven. And the value according to the variation rate of the tracking actuator 4 is outputted from the tracking actuator displacement detection means 13, and this output is inputted into the coarse adjustment motorised means

12 through the coarse adjustment motor control means 14, and it drives the coarse adjustment motor 11 so that an optical spot may come to the core of the coarse adjustment motor 11. Namely, the coarse adjustment motor 11 is driven in the direction which makes the variation rate of the tracking actuator 4 small. And if the predetermined number of trucks is jumped, a track jump termination command will be outputted from track jump initiation / termination command generating means 9, and will switch the output of the 1st selection means 10 to the output of the tracking control means 8 from the output of the acceleration-and-deceleration means 7, a track jump will be ended, and tracking control will be performed.

[0006] The wave of the output of the 1st selection means 10 when performing a track jump to drawing 6 is shown. In drawing 6, an axis of abscissa expresses time amount and the axis of ordinate expresses the electrical potential difference. The time of day when, as for T2 in drawing, the track jump initiation command was outputted to the 1st selection means 10, and T3 express the time of day when the track jump termination command was outputted to the 1st selection means 10. From time of day T2, the 1st selection means 10 chooses the output of the acceleration-and-deceleration means 7, and the 1st selection means 10 chooses the output of the tracking control means 8 before time of day T2 and after time-of-day T3 for time-of-day T3.

[0007]

[Problem(s) to be Solved by the Invention] However, it had the trouble that it becomes impossible for a coarse adjustment motor to follow actuation of a tracking actuator enough since the speed of response of a coarse adjustment motor is slower than the speed of response of a tracking actuator when performing a track jump with the configuration of the above-mentioned former, and the variation rate of a tracking actuator becomes large, and an optical spot was larger than an optical-axis core, shifted, and the focus immediately after jump-during track jump actuation (it abbreviates to following jump actuation) actuation and tracking control became unstable.

[0008] an optical-axis gap this invention solves the above-mentioned conventional trouble, and according to the variation rate of a tracking actuator -- controlling -- a jump -- it aims at working and offering the track jump equipment which carries out the focus immediately after jump actuation, and tracking control to stability, and carries out jump actuation to stability.

[0009]

[Means for Solving the Problem] In order to attain this purpose the track jump equipment of this invention the tracking actuator which detects the variation rate of a tracking actuator -- a variation rate -- with a detection means A relative-speed-detector means to detect the relative velocity of a truck and an optical spot by considering the output of an optical pickup as an input, It has the configuration of a comparison means to compare the output and predetermined value of a tracking actuator displacement detection means, and a selection means to choose one of the output of an acceleration-and-deceleration means, and the outputs of a tracking control means according to the output of a comparison means.

[0010] moreover, the tracking actuator with which the track jump equipment of this invention detects the variation rate of a tracking actuator -- a variation rate -- with a detection means A relative-speed-detector means to detect the relative velocity of a truck and an optical spot by considering the output of an optical pickup as an input, The 1st comparison means which compares the output of a tracking actuator displacement detection means with the 1st predetermined value, The 2nd comparison means which compares the output of a relative-speed-detector means with the 2nd predetermined value, It has the configuration with the selection means which switches the output chosen with the output of the 1st comparison means from the output of an acceleration-and-deceleration means to the output of a relative-velocity oppression means, and switches the output chosen with the output of the 2nd comparison means from the output of a relative-velocity oppression means to the output of a tracking control means.

[0011]

[Function] the configuration which described this invention above -- a jump -- an optical-axis gap according to the variation rate of a tracking actuator by interrupting jump actuation, if the variation rate of a tracking actuator exceeds a predetermined value working, and turning on tracking control at the point -- controlling -- a jump -- the focus immediately after working and jump actuation and tracking

control are carried out to stability, and jump actuation is carried out to stability.

[0012]

[Example] Hereafter, one example of this invention is explained, referring to a drawing.

[0013] Drawing 1 is the block diagram showing the 1st example of the track jump equipment of this invention. The optical disk with which the information signal is recorded with the truck gestalt predetermined in 1 in drawing 1, A rotation means by which 2 rotates an optical disk 1, and 3, by condensing a light beam to the information side of an optical disk 1, forming an optical spot in it, and detecting the reflected light The optical pickup which outputs the disk radial relative-position error of the information signal and the truck, and the optical spot which were recorded, The tracking actuator which 4 makes move an optical spot to the disk radial, The tracking driving means to which 5 drives the tracking actuator 4, A tracking error signal generation means by which 6 generates a tracking error signal from the output of an optical pickup 3, An acceleration-and-deceleration means by which 7 accelerates or slows down a tracking actuator, The tracking control means which 8 considers a tracking error signal as an input, and performs tracking control, A track jump initiation / termination command generating means by which 9 generates initiation of a track jump and the command of termination, and 10 with the output of track jump initiation / termination command generating means 9, and the output of the 1st comparison means 15 The 1st selection means which chooses one of the output of the acceleration-and-deceleration means 7, and the outputs of the tracking control means 8, The coarse adjustment motor which 11 makes move the optical pickup 3 whole to the disk radial, a coarse adjustment motorised means by which 12 drives the coarse adjustment motor 11, and the tracking actuator, with which 13 detects the variation rate of the tracking actuator 4 -- a variation rate -- a detection means -- 14 -- a tracking actuator -- a variation rate -- the coarse adjustment motor control means which controls the coarse adjustment motor 11 by considering the output of the detection means 13 as an input, and 15 -- a tracking actuator -- a variation rate -- it is the 1st comparison means which compares the output of the detection means 13 with the predetermined value a.

[0014] About the track jump equipment of this example constituted as mentioned above, the actuation is explained below.

[0015] When performing a track jump, a track jump initiation command is outputted from track jump initiation / termination command generating means 9, and the output of the 1st selection means 10 is switched to the output of the acceleration-and-deceleration means 7 from the output of the tracking control means 8. About the acceleration-and-deceleration approach in the acceleration-and-deceleration means 7, although what kind of approach may be used, it shall be based on the seal of approval of a pulse as an example here. Thus, an acceleration-and-deceleration pulse is inputted into the tracking driving means 5, and drives the tracking actuator 4. Here, since an optical spot does not shift more greatly than an optical-axis core when the variation rate of the tracking actuator 4 is sufficiently small, jump actuation is performed, without focal control separating. And if the predetermined number of trucks is jumped, a track jump termination command will be outputted from track jump initiation / termination command generating means 9, and will switch the output of the 1st selection means 10 to the output of the tracking control means 8 from the output of the acceleration-and-deceleration means 7, a track jump will be ended, and tracking control will be performed. About this, it is the same as that of the conventional example.

[0016] however, when it becomes impossible for the coarse adjustment motor 11 to have followed enough and the variation rate of the tracking actuator 4 becomes large in actuation of the tracking actuator 4 at the time of jump actuation the conventional example -- an optical spot -- an optical-axis core -- large -- shifting -- a jump -- the focus of an immediately after [ working and jump actuation ] -- The output of the detection means 13 is compared with the predetermined value a. tracking control became unstable -- receiving -- this example -- the 1st comparison means 15 -- a tracking actuator -- a variation rate -- When the output of the tracking actuator displacement detection means 13 becomes larger than the predetermined value a, a track jump interruption command is outputted and, thereby, the output of the tracking control means 8 is chosen from the 1st comparison means 15 in the 1st selection means 10. Thus, jump actuation is interrupted and tracking control is turned on. This actuation is

explained in detail using drawing 3.

[0017] Drawing 2 shows the wave form chart showing each wave when carrying out a track jump in the 1st example of this invention. In drawing 2, an axis of abscissa expresses time amount and the axis of ordinate expresses the electrical potential difference. A -- a tracking actuator -- a variation rate -- the output of the detection means 13, i.e., a tracking actuator, -- a variation rate -- a signal and the tracking actuator with which the output of the 1st selection means 10 and 'a' can carry [ B ] out a focus and tracking control to stability in the output of the 1st comparison means 15, and C -- it is the maximum allowed value of a variation rate.

[0018] First, the tracking actuator displacement detection means 13 detects the variation rate of a tracking actuator. About this detection approach, although what kind of approach may be used, the average of the coil current of a tracking actuator shall be detected as an example here. When the tracking actuator displacement signal A becomes a bigger value than 'a' now, the output B of the 1st comparison means 15 is set to H level, and a track jump interruption command is outputted. And thereby, the output C of the 1st selection means 10 switches from the output of the acceleration-and-deceleration means 7 to the output of the tracking control means 8. That is, as the continuous line showed, a track jump will be interrupted for the place which performs a track jump by the pulse originally shown by the dotted line of Wave C in the seal of approval of an acceleration pulse, and tracking control will be turned on.

[0019] the tracking actuator which detects the variation rate of the tracking actuator 4 as mentioned above according to this example -- a variation rate -- with the detection means 13 a tracking actuator -- a variation rate -- the output of the detection means 13, and a tracking actuator -- with the 1st comparison means 15 which compares the predetermined value (the maximum allowed value) which does not cause the optical-axis gap by the variation rate By establishing the 1st selection means 10 which chooses one of the output of the acceleration-and-deceleration means 7, and the outputs of the tracking control means 8 according to the output of the 1st comparison means 15 the optical-axis gap by the variation rate of the tracking actuator 4 -- controlling -- a jump -- the focus immediately after working and jump actuation -- Tracking control is carried out to stability, and even when the flattery of the coarse adjustment motor 11 to actuation of the tracking actuator 4 is inadequate, jump actuation can be carried out to stability.

[0020] Drawing 3 is the block diagram showing the 2nd example of the track jump equipment of this invention. In this drawing, 1-15 are the same as that of the configuration of drawing 1. A relative-velocity oppression means 16 by which differing from drawing 1 drives a tracking actuator in the direction which oppresses the relative velocity of a truck and an optical spot, A relative-speed-detector means 17 to detect the relative velocity of a truck and an optical spot, The 2nd comparison means 18 which compares the output of the relative-speed-detector means 17 with the predetermined value b, It responds to the output of the 1st comparison means 15, and the output of the 2nd comparison means 18. It is the point which established the 2nd selection means 19 which chooses one of the output of the relative-velocity oppression means 16, and the outputs of the 1st selection means 10, and considered the output of the 2nd selection means 19 as the configuration inputted into the tracking driving means 5.

[0021] About the track jump equipment constituted as mentioned above, the actuation is explained below.

[0022] When the variation rate of the tracking actuator 4 is sufficiently small, it is the same as that of the conventional example and the 1st example. however, when it becomes impossible for the coarse adjustment motor 11 to have followed enough and the variation rate of the tracking actuator 4 becomes large in actuation of the tracking actuator 4 at the time of jump actuation the conventional example -- an optical spot -- an optical-axis core -- large -- shifting -- a jump, working and when the focus of an immediately after [ jump actuation ] and tracking control become unstable To jump actuation having become unstable, by this example, an optical-axis gap is controlled and jump actuation can be carried out to stability. This actuation is explained in detail using drawing 4 below.

[0023] Drawing 4 shows the wave form chart showing each wave when carrying out a track jump in the 2nd example of this invention. In drawing 4, an axis of abscissa expresses time amount and the axis of ordinate expresses the electrical potential difference. A -- a tracking actuator -- a variation rate -- the output of the detection means 13, i.e., a tracking actuator, -- a variation rate -- a signal -- The output of



the 1st comparison means 15 and D B The output of the relative-speed-detector means 17, the tracking actuator with which the output of the 2nd selection means 19 and 'a' can carry out a focus and tracking control to stability in E -- the maximum allowed value of a variation rate -- 'b' The maximum allowed value of the relative velocity of the truck and the optical spot in which truck drawing in is sufficiently possible, The time of day when, as for T0, the track jump interruption command was outputted from the 1st comparison means 15, the time of day when tracking control turned on T1, and T are the time amount (T1-T0) from time of day T0 to time of day T1.

[0024] First, the tracking actuator displacement detection means 13 detects the variation rate of the tracking actuator 4. This detection approach shall detect the average of the coil current of the same tracking actuator 4 as the 1st example. When the tracking actuator displacement signal A becomes a bigger value than 'a' at time of day T0 now, the output B of the 1st comparison means 15 is set to H level, and a track jump interruption command is outputted. And thereby, the output E of the 2nd selection means 19 switches to the output of the relative-velocity oppression means 16 from the output of the 1st selection means 10, i.e., the output of the acceleration-and-deceleration means 7. About the oppression approach in the relative-velocity oppression means 16, although what kind of approach may be used, it shall be based on the seal of approval of a pulse as an example here. In this way, the seal of approval of the moderation pulse is carried out to the tracking driving means 5. The output of the 1st selection means 10 also switches from the output of the acceleration-and-deceleration means 7 to the output of the tracking control means 8 by track jump interruption command at coincidence at this time. And the relative velocity of a truck and an optical spot and predetermined value 'b' are compared by the 2nd comparison means 18. When relative velocity becomes a value smaller than 'b' (time of day T1), a tracking control ON command is outputted from the 2nd comparison means 18. By this command the output of the 2nd selection means 19 It switches from the output of the relative-velocity oppression means 16 to the output of the 1st selection means 10, i.e., the output of the tracking control means 8, and tracking control starts the tracking driving means 5. That is, after it interrupts a track jump for time of day T0 for the place which performs a track jump by the pulse originally shown by the dotted line of Wave E in the seal of approval of an acceleration pulse as the continuous line showed, and T carries out the between seal of approval of the moderation pulse, tracking control will be turned on at time of day T1.

[0025] Thus, since tracking control is turned on after carrying out the seal of approval of the moderation pulse and slowing down a tracking actuator enough in case a track jump is interrupted, compared with the 1st example, more stable truck drawing in becomes possible and can carry out tracking control immediately after jump actuation to stability more.

[0026] the tracking actuator which detects the variation rate of the tracking actuator 4 as mentioned above according to this example -- a variation rate -- with the detection means 13 a tracking actuator -- a variation rate -- the output of the detection means 13, and a tracking actuator -- with the 1st comparison means 15 which compares the 1st predetermined value (the maximum allowed value a) which does not cause the optical-axis gap by the variation rate A relative-speed-detector means 17 to detect the relative velocity of a truck and an optical spot, An output and truck drawing in of the relative-speed-detector means 17 with the output of the 2nd comparison means 18 which compares the 2nd predetermined value (the maximum allowed value b) of the relative velocity of a sufficiently possible truck and optical spot, and the 1st comparison means 15 The 1st selection means 10 which switches the output to choose to the output of the tracking control means 8 from the output of the acceleration-and-deceleration means 7, The output chosen with the output of the 1st comparison means 15 is switched to the output of the relative-velocity oppression means 16 from the output of the 1st selection means 10. By establishing the 2nd selection means 19 which switches the output chosen with the output of the 2nd comparison means 18 from the output of the relative-velocity oppression means 16 to the output of the 1st selection means 10 the optical-axis gap by the variation rate of the tracking actuator 4 -- controlling -- a jump -- the focus immediately after working and jump actuation -- Tracking control is carried out to stability, and even when flatness of a coarse adjustment motor is inadequate, jump actuation can be carried out to actuation of the tracking actuator 4 at stability.



[0027] In addition, in the 1st example although [ the 1st selection means 10 / the output chosen with the output of the 1st comparison means 15 ] switched to the output of the tracking control means 8 from the output of the acceleration-and-deceleration means 7, what kind of combination is sufficient as the selection approach of an output.

[0028] in addition, the 1st and 2nd examples -- setting -- a tracking actuator -- a variation rate -- although [ the detection means 13 ] the average of the coil current of the tracking actuator 4 is detected - - an optical variation rate -- a detection sensor etc. may be used.

[0029] Moreover, in the 1st and 2nd examples, although an acceleration-and-deceleration pulse seal of approval performs jump actuation, jump actuation may be what kind of acceleration-and-deceleration approach.

[0030] Moreover, each means in the 1st example and 2nd example is realizable by hardware, software, analog processing, digital processing, and any approach.

[0031]

[Effect of the Invention] an optical-axis gap as mentioned above, this invention compares the output and the predetermined value which detected the variation rate of a tracking actuator, writes it as the configuration which chooses one of an acceleration-and-deceleration output and the tracking control outputs according to the comparison output, and controls a tracking actuator, and according to the variation rate of a tracking actuator -- controlling -- a jump -- the focus immediately after working and jump actuation and tracking control can carry out to stability, and jump actuation can carry out to stability.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the configuration of the track jump equipment in the 1st example of this invention

[Drawing 2] The wave form chart showing actuation of the track jump equipment in this 1st example

[Drawing 3] The block diagram showing the configuration of the track jump equipment in the 2nd example of this invention

[Drawing 4] The wave form chart showing actuation of the track jump equipment in this 2nd example

[Drawing 5] The block diagram showing the configuration of conventional track jump equipment

[Drawing 6] The wave form chart showing actuation of the track jump equipment in the example of  
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[Description of Notations]

7 Acceleration-and-Deceleration Means

8 Tracking Control Means

10 1st Selection Means

13 Tracking Actuator Displacement Detection Means

15 1st Comparison Means

16 Relative-Velocity Oppression Means

17 Relative-Speed-Detector Means

18 2nd Comparison Means

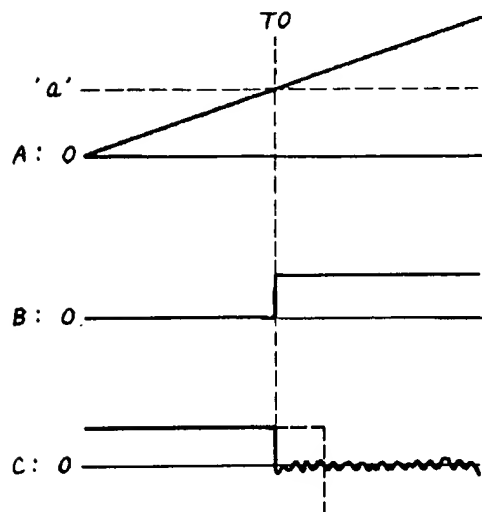
19 2nd Selection Means

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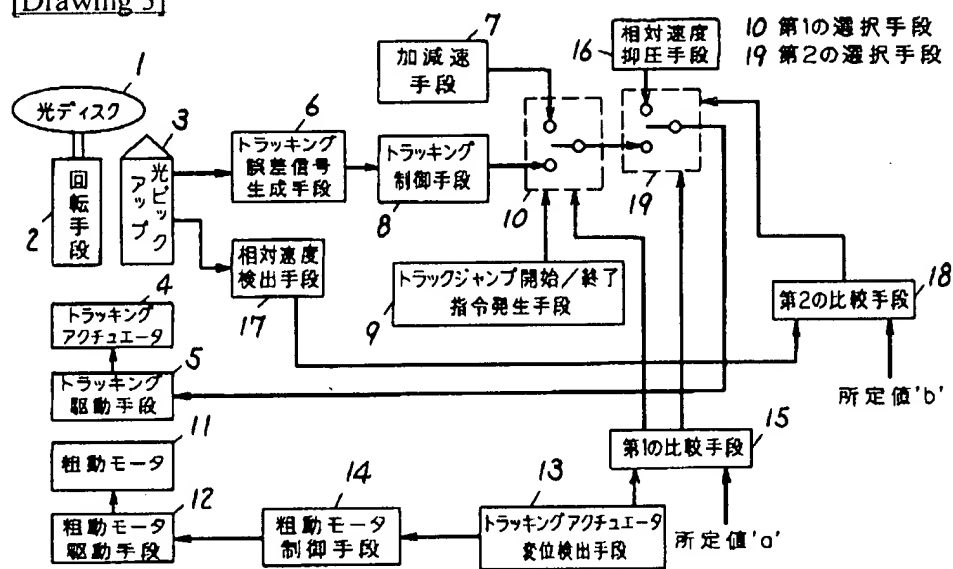
[Translation done.]



- A トラッキングアクチュエータ変位信号  
 B 比較手段15の出力  
 C 第1の選択手段10の出力

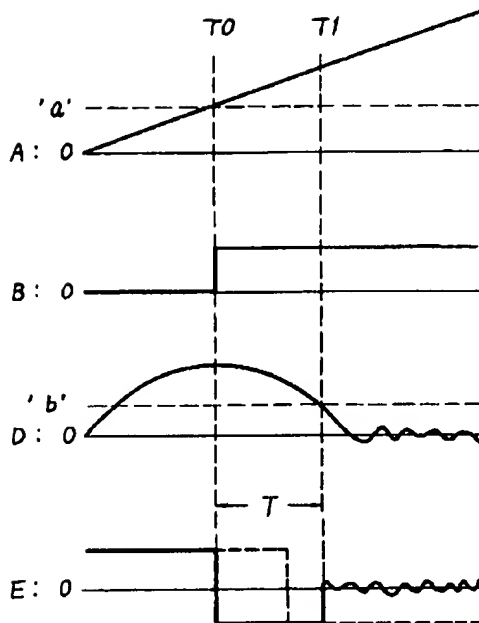


[Drawing 3]

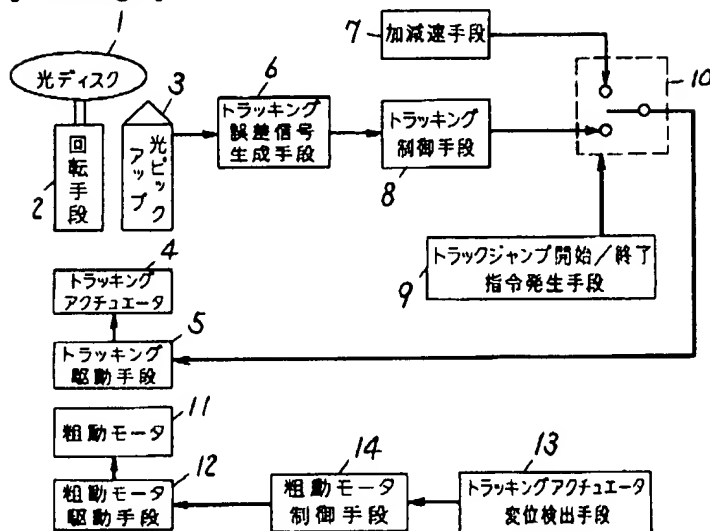


[Drawing 4]

- A トラッキングアクチュエータ変位信号  
 B 比較手段15の出力  
 D 相対速度検出手段17の出力  
 E 第2の選択手段18の出力



[Drawing 5]



10 第1の選択手段

[Translation done.]